THE CAUSALITY BETWEEN ECONOMIC GROWTH AND GOVERNMENT EXPENDITURE IN NIGERIA

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ABSTRACT

The Purpose. *The paper studies the causal relationship between economic growth and government expenditure between 1970 and 2016.*

Design/Methodology/Approach. *The study employed modern co-integration techniques, Granger causality test within an error-correction modeling framework and variance decomposition analysis.*

Findings/Implications. *The co-integration test found that a co-integration relationship exists between economic growth and government expenditure. The Granger Causality test result shows that there exist both short run and long run bidirectional relationships between the variables with causality stronger from economic growth to government expenditure than the opposite direction as proved by the variance decomposition analysis.*

Originality. *The Granger Causality test results found that both economic growth and government expenditure have a cause effect on each other, suggesting that both variables are growing substantially. Using the variance decomposition analysis result as a basis for policy formulation, the government should ensure that resources are well managed and allocated efficiently among competing needs to accelerate economic growth.*

1. INTRODUCTION

The need to unravel the direction of causality between economic growth and government expenditure has resulted to two approaches, Wagner's and Keynes' approaches, thus dividing scholars into two groups. Wagner and his supports are of the view that government expenditures are caused by economic growth, while Keynes' group opines that public expenditure is the main tool to boost economic growth. This has generated varying debates given the data sets, theories and the methodologies or techniques adopted. For instance, while (Mitchell, 2005) believes that government uses resources less efficiently, and that the various methods of financing government (taxes, borrowing, and printing money), are inimical to growth, Hsieh *et al* (1994), Loizides *et al* (2005), etc, are of the view that economic growth causes increases in government expenditure. In other to fill the empirical gaps exposed by these studies, this paper seeks to dig more the direction of causality between government expenditure and economic growth in Nigeria by deploying a more robust and sophisticated econometric technique based on co-integration and error correction modeling framework. This paper will update the data used by Omo (2006) to 2016. Giving the upsurge in government expenditure and GDP, a decade is big enough for there to be changes in the direction of relationship between the variables under study. The study will also carry out Granger causality test within an error-correction modeling framework which allows for dynamic specifications by taking into account of the distinction between a long term relationship and short term adjustment. The result from this analysis would assist policy makers in formulating budgetary adjustment plans so as to achieve specified objectives. It will also help in instilling discipline in the expenditures patterns of government.

The rest of this study is organized as follows; relevant literature review will be presented in section two. Section three showcases econometric methodology. This is followed by the presentation of the empirical findings and analysis in section four. Finally, in section five, concluding remarks are provided.

2. LITERATURE REVIEW

This study is predicated on the argument between Wagner and Keynes and their supporters on the relationship between public expenditure and economic growth. Wagner introduced a model that government expenditures are endogenous to economic development, while Keynes and his supporters argue that public expenditure is the main tool to boost the economic activities. This has led to varying opinions because such studies were done using varying measurements of different data sets, theories, methodologies or techniques.

In his paper, Landau (1983) examined the relationship between the share of government consumption expenditure in GDP and the rate of growth of real per capita GDP for 104 countries. The results of this study suggest a negative relationship exists between the share of government consumption expenditure in GDP and the rate of growth of per capital GDP. This study also found the relationship between total investment in education and the growth rate is also positive and highly significant in the regressions for all time periods for both the full set and all subsets of countries.

Hsieh *et al* (1994) utilized a multivariate time series, paying particular emphasis to the causal pattern and the shape of impulse response function in the context of vector autoregression to examine the intertemporal interactions among the growth rate in per capita real GDP, the share of government spending, and the ratio of private investment in GDP for a group of seven countries. Their result shows that the relationship between government spending and growth can vary significantly across time as well as across the major industrialized countries that presumably belong to the same growth club. This result shows no consistent evidence that government spending can increase per capita output growth.

In other to examine if the share of total expenditure in *GNP* can be determined to Granger cause the rate of economic growth, or vice versa. Loizides *et al* (2005) first adopted the use of a bivariate error correction model within a Granger causality framework, as well as adding unemployment and inflation (separately) as explanatory variables, creating a simple 'trivariate' analysis for each of these two variables. These analyses of bivariate and trivariate tests using data on Greece, UK and Ireland, show that government size Granger causes economic growth in all countries of the sample in the short run and in the long run for Ireland and the UK. Also, economic growth Granger causes increases in the relative size of government in Greece, and, when inflation is included, in the UK.

Bose *et al* (2007) investigated the growth effects of government expenditure for a panel of thirty developing countries for the period of 1970-1990, with a particular focus on sectoral expenditures. Their result shows that the share of government capital expenditure in GDP is positively and significantly correlated with economic growth, but current expenditure is insignificant. The result of their sectoral analysis shows that government investment in education and total expenditures in education are the only outlays that are significantly associated with growth once the budget constraint and omitted variables are taken into consideration.

Mo (2007) estimated how government expenditures affect the growth rate of real GDP through total factor productivity, investment, and aggregate demand using cross-country data in the period 1970 to 1985. He found that except government investment, all government expenditures have negative marginal effect on productivity and GDP growth.

In his study, Cooray (2009) investigated the role of government in economic growth by extending the neoclassical production function to incorporate the size and quality dimensions of government measured by government expenditure and governance respectively. His result on a cross section of 71 economies using generalized method of moments (GMM) indicates that both the size and quality of government are important for economic growth. As a result, they argued that investing in the capacity for enhanced governance is a priority for the improved growth performance of the countries examined.

Alexiou (2009) provided further evidence on the relationship between economic growth and government spending. He applied two different panel data methodologies (standard pool estimates, and the random coefficients estimates (GLS)) to seven transition economies in the South Eastern Europe (SEE) for the period 1995 to 2005. The evidence derived from their result indicates that governments spending on capital formation, development assistance, private investment and trade-openness have positive and significant effect on economic growth, while Population growth is found to be statistically insignificant.

Mohammadi *et al* (2012) studied the effect of governmental expenditure composition on the development of Economic Cooperation Organization countries (ECO) in the period 1995-2009. They applied dynamic panel data method & generalized method of moments (GMM) on three types of public expenditure; health, education and defense expenditures. Their findings show that health expenditure by governmental has a negative and statistically significant effect on growth, expenditures on education and defense by governmental have positive and statistically significant relationships with economic development of ECO countries.

Abu-Eideh, O. M. (2015) investigated the causal relationship between public expenditure and the GDP growth in the Palestinian territories over the period of 1994-2013. The Engle-Granger cointegration test adopted proved that a long-run relationship between public expenditure and GDP growth exists in the Palestinian case. The Granger causality tests also found that both public expenditure and GDP have a cause effect on each other.

In Nigeria, there are also mixed findings on the relationship between government expenditure and economic growth. For instance, Omo (2006) examined the tendency for public expenditure to grow relative to national income against the contending proposition that it is the changes in public expenditure that trigger those of national income using Nigeria's data over the period 1970-2003. His result from co-integration and causality techniques shows that there exists a unidirectional causality from national income to total public expenditure, while a bi-directional causality exits between non-transfer public expenditure and national income.

Omoke (2009) tested for the direction and level of causality between government expenditure and national income in Nigeria using annual data for the period 1970-2005. Their results from co-integration and Granger Causality tests show that there is no long-run relationship between government expenditure and national Income in Nigeria and that causality runs from government expenditure to national Income.

Abu et al (2010) studied the effect of government expenditure on economic growth in Nigeria between 1970 and 2008. Employing error correction technique, their results reveal that government total capital expenditure, total recurrent expenditures and government expenditure on education have negative effect on economic growth, while government expenditure on transport and communication and health results to an increase in economic growth.

Loto (2011) investigated the growth effects of sectoral government expenditure in Nigeria over the period of 1980 to 2008 using co-integration analysis and Error correction technique. The result shows that in the short-run, expenditure on agriculture was found to be negatively related to economic growth. The impact of education, though also negative was not significant. The impact of expenditure on health was found to be positively related to economic growth while expenditures on national security transportation and communication were positively but statistically insignificantly related to economic growth.

Taiwo (2011) analyzed the implications of government spending on the growth of Nigeria economy over the period 1980-2009. Using Johansen co-integration, unit root test and error correction model, their result discovered that total capital expenditure, inflation rate, degree of openness and current government revenue are significant variables to improve growth in Nigeria. They therefore recommended that future expenditure on capital and recurrent should be managed along with adequate manipulation of other macroeconomic variables to ensure steady and accelerate growth.

In their paper, Obeh *et al* (2012) investigated the relationship between government expenditure in the education sector and economic growth in Nigeria using time series data from1986 to 2011. Employing Johasen co-integration technique and error correction method, their result shows that long run relationship exists between the variables and that recurrent expenditures and gross capital formation exhibit positive impact on economic growth while capital expenditures on education and human capital development have negative and significant impact on economic growth.

With the objective to analyze the effect of public government spending on economic growth in Nigeria between 1970 and 2009, Nworji *et al* (2012) found that capital and recurrent expenditure have insignificant and negative effects on economic growth. They also observed that capital expenditure on transfers has insignificant positive effect on growth, while capital and recurrent expenditures on social and community services and recurrent expenditure on transfers have significant positive effect on economic growth.

Nasiru, I. (2012) examined the cointegration and causality analysis of Government Expenditure and Economic Growth in Nigeria employing Bounds Test approach to cointegration based on unrestricted Error Correction Model and Pair wise Granger Causality tests. When real GDP is taken as dependent variable, the results from the Bounds Test indicate that there exists no long run relationship between government expenditure and economic growth. The causality results reveal that while government capital expenditure granger causes economic growth, no causal relationship was exists between government recurrent expenditure and economic growth in Nigeria.

Akpokerere *et al.* (2013) investigated the effect of disaggregated government expenditure on economic growth in Nigeria between 1977 and 2009. Using the multiple regression technique, they found that Government total capital expenditure, total recurrent expenditures, Government expenditure on education and power have negative and significant effect on economic growth. They also found that rising Government expenditure on transport and communication, and health result to an increase in economic growth.

Employing the ordinary least square multiple regression analysis, Granger Causality test, Johansen co-integration test and error correction mechanism to estimate time series data of 32years period (1980-2011), Okoro (2013) investigated the impact of government capital expenditure and recurrent spending on Nigerian economic growth. The result shows that there exists a long-run equilibrium relationship between government spending and economic growth in Nigeria.

Egbetunde, T. & Ismail O. Fasa, I. O. (2013) analysed the impact of public expenditure on economic growth in Nigeria during the period 1970 to 2010 making use of annual time series data. The results from the bounds testing (ARDL) approach suggested that public expenditure and economic growth variables are bound together in the long run, and that the associated equilibrium correction was also significant confirming the existence of long run relationships. The results indicate that total public spending has a negative relationship with economic growth, while recurrent expenditure has little significant positive impact on growth.

Jelilov, G. & Musa, M. (2016) examined the impact of Government Expenditure on Economic Growth in Nigeria, using time series data spanning 1981-2012. The OLS technique employed found that government expenditure has a positive and significant impact on economic growth.

Idris, M. & Bakar, R. (2017) continued the Search for a Stable Relationship between Public Sector Spending and Economic Growth in Nigeria. The result from the ARDL model employed reveals that there exists a positive and significant relationship between public spending on economic growth in Nigeria.

3. ECONOMETRIC METHODOLOGY

Following Fasano and Wang (2002), after determining that the variables of the model are co-integrated, we will estimate the Granger causality test within an error-correction modeling framework in which we shall include a mechanism of error correction model (ECM). However, we will adopt the normal Granger causality method without the error correction term where the variables are stationary and that there is no co-integration between the variables in the equation. The data on the variables are sourced from the various issues of the Central Bank of Nigeria (CBN) Statistical Bulletin. The models of the causality between government expenditure and economic growth when the variables used in the study are stationary series are specified empirically below:

$$GDP_t = \alpha_0 + \alpha_1 GEXP_t + \varepsilon_1 \tag{1}$$

$$GEXP_t = \beta_0 + \beta_1 GDP_t + \varepsilon_2 \tag{2}$$

GDP_t is GDP at current market cost; $GEXP$ is government expenditure; $\alpha_0, \alpha_1, \beta_0, \beta_1$ are the coefficients to be estimated and $\varepsilon_1, \varepsilon_2$ are the stochastic error terms with all the standard attributes. We decided to use total expenditure because it is mostly important in determining government deficit, debt and the overall sustainability of public finances.

3.1. Unit Root Tests

We will determine the stationarity properties of the variables using the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests. According to Obioma & Ozughalu (2010), the ADF approach accounts for the autocorrelation of the first differences of a series in a parametric manner by estimating additional nuisance parameters, the PP non-parametric test on the other hand generalizes the ADF procedure and takes care of the serial correlation in the error terms without adding lagged difference terms, allowing for less restrictive assumptions for the time series in question. These tests are used in order to guarantee that our inferences regarding the important issues of stationarity are not based on the choice of the testing procedure used. We will also apply the variance decomposition approach in the event of bidirectional causality to determine the strength of causal relationship between the variables.

The ADF test is estimated through the equation below;

$$\delta K_t = \alpha_1 + \alpha_2 t + dK_{t-1} + \sum_{i=1}^{n} \chi_i \delta K_{t-i} + \mu_t \tag{3}$$

Where, δ is difference operator; K_t is the variable to be estimated; α_1, α_2, d and χ_i are the various parameters; μ_t is a pure white noise error term. The ADF tests either $d = 0^1$ or not.

The PP test estimates the equation 4.

$$\delta d_t = b + \alpha d_{t-1} + \mu_t \tag{4}$$

μ_t is a white noise error term assumed to be stationary I(0) with zero mean and constant variance. This test is done to reject the null hypothesis of a unit root $(\alpha = 1)$.

3.2. Co-integration Tests

This study will adopt the Engel-Granger (EG) and the Johansen maximum-likelihood co-integration tests. The EG tests the stationarity of the residuals from the equations of interest. The variables under consideration are co-integrated if the residuals are stationary at level. However, EG assumes arbitrary normalization of the co-integrating vector and can also be extremely weak under mild cases of autocorrelation. Since the EG test is not very powerful and robust when compared with the Johansen co-integration test, it becomes necessary to complement it with the Johansen test which is a full information maximum likelihood ratio statistics with exactly known distributions. Following Obioma & Ozughalu (2010), we present the vector autoregressive (VAR) model of order p for Johansen co-integration test as follows.

$$K_t = B_1 Y_t + - - + B_p Y_{t-p} + AX_t + et \tag{5}$$

K_t is a k-vector of non-stationary I(1) variables, X_t is a d-vector of deterministic variables, while et is a vector of innovations. Equation 5 can also be rewritten as follows:

$$\delta K_t = \Pi K_{t-1} + \sum_{i=1}^{p-1} \Gamma_t \delta K_{t-i} + AX_t + et. \tag{6}$$

Where

$$\Pi = \sum_{i=1}^{p} B_i - I, \Gamma_i = - \sum_{j=i+1}^{p} B_j \tag{7}$$

The Johansen maximum-likelihood co-integration test estimates the Π matrix from an unrestricted VAR, and also whether we can reject the restrictions implied by the reduced rank of Π. Granger's representation theorem assumes that if the coefficient matrix Π has reduced rank $r \prec k$, then there exists *kxr* matrices α and β, each with rank *r* such that $\Pi = \alpha\beta'$ and $\beta' Y_t$ is I(0); *r* is the number of co-integrating relations and each column of β is the co-integrating vector. The elements of α are known as the adjustment parameters in the vector error correction model. If the variables are co-integrated, a dynamic error correction models (ECMs) that take into account the underlying co-integration properties is constructed. The ECM adds another regressor, the estimated residuals obtained from the associated co-integrating equations into the error correction model.

3.3. Error Correction Term

After determining that the variables of the model are co-integrated, we will adopt the methodology of Fasano and Wang (2002) where we will carry out the

Granger causality test within an error-correction modeling framework. The error-correction model has arisen from the long-run co-integration relationship. We specify the following error-correction model equations;

$$\delta GDP_t = \alpha_1 + \alpha_2 \delta GDP_{t-1} + \alpha_3 \delta GEXP_{t-1} + \alpha_4 ecm1(-1) + \varepsilon_1 \quad (8)$$

$$\delta GEXP_t = \beta_1 + \beta_2 \delta GEXP_{t-1} + \beta_3 \delta GDP_{t-1} + \beta_4 ecm2(-1) + \varepsilon_2 \quad (9)$$

where α and β are the coefficients, δ is the change operator, ε_1 and ε_2 are the error terms, $ecm1(-1)$ and $ecm2(-1)$ are the one-period lagged fitted values of ε_1 and ε_2 from equations 1 and 2 respectively, and they give another avenue through which the effects of causality can occur. Specifically, α_2 and α_3 show the effect of past values of δGDP_t and $\delta GEXP_t$ on δGDP_t, while β_2 and β_3 describe the effects of past values of $\delta GEXP_t$ and δGDP_t on $\delta GEXP_t$.

The Granger causality is tested through the null hypothesis that $\alpha_3 = \alpha_4 = 0$ in equation 8 and $\beta_3 = \beta_4 = 0$ in equation 9. If these hold, then there is no causality between the variables since the current value of each variable is only affected by its own lag values. In addition, a unidirectional relationship ensues if $\alpha_3 \neq 0$ and/or $\alpha_4 \neq 0$, and also $\beta_3 \neq 0$ and/or $\beta_4 \neq 0$ holds in the equations. In these cases, δGDP_t is said to be caused by $\delta GEXP_t$, while $\delta GEXP_t$ is caused by δGDP_t in equations 8 and 9 respectively. Furthermore, if both $\alpha_3 \neq 0$ and $\beta_3 \neq 0$ hold, there is a bidirectional short run causality. The statistical significance of the parameter estimates associated with the error correction terms i.e. $\alpha_4 \neq 0$ and $\beta_4 \neq 0$ show that the relationship between the variables in the estimated model is long run. In both cases, the variables are related to current and/or past effects of the other variable.

4. EMPIRICAL FINDINGS AND ANALYSIS

The empirical findings are presented in this section:

4.1. Unit root Results

As shown in Table 1., the unit root tests are carried out using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) teats. It is observed that test statistics are greater than 1% or 5% critical values either in models 1, 2 or 3 at level. Thus, the two variables (GEXP, GDP) are found to be stationary at level, i.e. I(0).

Table 1.: Unit Root Tests

Augmented Dickey-Fuller								
		(ADF) Test			Phillips-Perron (PP)			Decision
Variable		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	
LGEXP		6.88*	4.22*	11.56*	19.1*	10.54*	24.13*	1(0)
LGDP		4.19*	4.19*	3.58*	7.98*	4.16**	9.62*	1(0)
	1%	-3.62	-4.27	-2.63	-3.61	-4.21	-2.62	
CRITICAL	5%	-2.94	-3.56	-1.95	-2.94	-3.53	-1.95	
VALUES	10%	-2.61	-3.21	-1.61	-2.61	-3.19	-1.61	

Note: *The Null hypothesis is the presence of unit root. Model 1includes a constant, model 2 includes a constant and a linear time trend while model 3 includes none in the regression as exogenous lags are selected based on Schwarz info criteria in ADF test. In the PP test, The Bandwith was chosen using Newey-West method with Barttlet Kernel spectral estimation (*), (**) and (***) indicate significance at 1%, 5% and 10% significance levels respectively.
Source: Author.

4.2. Co-integration Tests Results

Since we estimated that the variables are stationary, i.e. integrated of the same order one, 1(0), our co-integration test is therefore aimed at verifying whether a linear combination of these variables that are integrated of the same order one is stationary. If co-integration exists, then there is a long run relationship between the variables. A long run relationship between these variables under study will help us understand how they behave in the long run. Beginning with the EG test, the tests for the stationarity of the residuals (ECM1 & ECM2) from equations 1 and 2 in Table 2. shows that the residuals from the equations are stationary at level, that is, they are each integrated of order zero, i.e. 1(0). Thus, the EG co-integration test indicates that the variables in question are co-integrated.

Table 2.: Co-integration Tests Results of Residuals

Augmented Dickey-Fuller								
		(ADF) Test			Phillips-Perron (PP)			Decision
Variable		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	
ECM1		-2.95**	-297	-2.99*	-3.03**	-3.05	3.07*	1(0)
ECM2		-2.99**	-2.95	-3.03*	-3.07**	-3.03	-3.11*	1(0)
	1%	-3.58	-4.18	-2.62	-3.58	-4.18	-2.62	
CRITICAL	5%	-2.93	-3.51	-1.95	-2.93	-3.51	-1.95	
VALUES	10%	-2.60	-3.19	-1.61	-2.60	-3.19	-1.61	

Note: *The Null hypothesis is the presence of unit root. Model 1includes a constant, model 2 includes a constant and a linear time trend while model 3 includes none in the regression as exogenous lags are selected based on Schwarz info criteria in ADF test. In the PP test, The Bandwith was chosen using Newey-West method with Barttlet Kernel spectral estimation (*), (**) and (***) indicate significance at 1%, 5% and 10% significance levels respectively.
Source: Author.

The Johansen test is conducted to complement the EG test. Tables 3. and 4. present the Johansen co-integration test for equations 1 and 2. The results indicate that the models show that both max-eigenvalue and trace statistics indicate one co-integrating equation each at 5% significant level. These results reinforce the results of the EG test. We therefore conclude that there is the existence of long-run equilibrium relationships between economic growth and government expenditure in the models.

Table 3.: Model 1 (GDP and GEXP)

Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**Critical Value** 5 per cent	**Trace Statistic**	**Critical Value** 5 per cent
None *	0.58	37.94	14.26	40.15	15.49
At most 1	0.05	2.21	3.84	2.21	3.84

Note: * denotes the rejection of the hypothesis at the 5% level. Both Max-eigenvalue and trace statistics indicate 1 co-integrating equation each at 5% level.
Source: Author.

Table 4.: Model 2 (GEXP and GDP)

Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**Critical Value** 5 per cent	**Trace Statistic**	**Critical Value** 5 per cent
None *	0.58	37.94	14.26	40.15	15.49
At most 1	0.05	2.21	3.84	2.21	3.84

Notes: * denotes the rejection of the hypothesis at the 5% level. Both Max-eigenvalue and trace statistics indicate 1 co-integrating equation each at 5% level.
Source: Author.

4.3. Error Correction Results

The models are found to be co-integrated; we therefore conduct Granger causality tests within the error-correction modeling frameworks as specified in equations 8 and 9 above. We adopted a simple one-period lag length because it proved to be optimal given statistical considerations of Akaike Information Criterion (AIC) and the Schwartz Information Criterion (SIC). The error correction results presented below show that both the parameter estimates associated with lags of the explanatory variables in the two equations are significant at 5% level of significance, Also, the parameter estimates of the error correction terms are significant at 1% significant level. While the error correction term, ECM1 has the right negative sign, ECM2 is positively signed. This result however indicates that there is a short run as well as long run bidirectional causality between economic growth and government expenditure. Abu-Eideh, (2015) confirmed the same result in his investigation of the causal relationship between public expenditure and the GDP growth in the Palestinian territories over the period of 1994 to 2013, the Engle-Granger cointegration test he adopted proved that a long-run relationship between public expenditure and GDP growth exists in the Palestinian case, while he Granger causality tests also found that both public expenditure and GDP have cause effect on each other. On the other hand, this result disagrees with the findings of Omo (2006) whose result indicates a unidirectional causality running from economic growth to government expenditure. However, Omo (2006) did not deduce a co-integration relationship between national income and government expenditure and hence did not apply Granger causality based on error correction in the estimation of same. Our findings also departed from that of Omoke (2009), who though confirmed that a short run relationship exists between the variables, but proved that such relationship was unidirectional, with causality running from government expenditure to national income.

Table 5.: Granger Causality Tests within the Error-Correction models.

Dependent Variable: D(GDP)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	2.832	0.522	5.421	0.000
D(GEXP(-1))	**-44.999**	**a8.101**	**-5.555**	**0.000**
ECM(-1)	**-1.774**	**0.226**	**-7.860**	**0.000**
F-statistic			22.051	0.000
Durbin-Watson stat				2.024
Dependent Variable: D(GEXP)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GEXP(-1))	-0.446359	0.189320	-2.357697	0.0232
D(GDP(-1))	**0.029**	**0.010**	**2.924**	**0.006**
ECM(-1)	**0.310**	**0.101**	**3.073**	**0.004**
F-statistic			6.122	0.002
Durbin-Watson stat				1.909

Source: Author.

Given that our Granger causality result indicates a bidirectional relationship between economic growth and government expenditure, it became necessary to adopt a variance decomposition approach to determine the strength of the causal relationship from either of the variables. Part A which examines the variance decomposition of gross domestic product (GDP) or GDP innovation shows that the shocks in gross domestic product in the years result in very high changes in gross domestic product without significant impacts on government expenditure in the number of periods. In part B, the innovation in GEXP which determines the effect of GEXP on GDP showed a significant impact on GDP also. However, the shock is higher when compared with the shock by GDP. Although this result cannot be said to be fully supportive of either Wagner's assertion or Keynes' proposition, it shows that GDP has stronger impact on GEXP than vice versa. The result of the variance decomposition is presented in Table 6.

Table 6.: Variance Decomposition Results

Part A: Variance Decomposition of GDP		
		Innovations in:
Number of Periods	**GDP**	**GEXP**
1	100	0
2	98.91	1.09
3	98.37	1.63
4	98.22	1.78
5	98.19	1.81
Part B: Variance Decomposition of GEXP		
Number of Periods	**GDP**	**GEXP**
1	2.01	97.99
2	38.91	61.09
3	91.85	8.15
4	99.08	0.92
5	98.71	1.29

Note: Variance decomposition depends on the order in which the variables enter the VAR system and its innovations are orthogonalized by Choleski decomposition method. Based on the fact that the t-statistics from the causality was higher in the direction from GDP to GEXP than the opposite case, we ordered the variables by considering GDP first and next GEXP.
Source: Author.

5. CONCLUSIONS

The objective of this empirical investigation is to determine the causal relationship between economic growth and government expenditure in the case of Nigeria by employing Granger causality test within an error-correction modeling framework based on the outcome of the modern co-integration techniques, and also variance decomposition analysis. The test for unit root using the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests show that the variables are integrated of order zero, i.e. 1(0). Verifying whether a linear combination of these variables that are integrated of the same order one is stationary, our results from Engel-Granger (EG) and the Johansen maximum-likelihood co-integration tests show that a co-integration relationship exists between economic growth and government expenditure.

The result from the Granger Causality test based on error correction framework shows that both short and long run bidirectional relationship exist between the variables, suggesting that both variables are growing substantially. The variance decomposition analysis shows that the causality from economic growth to government expenditure was found to be stronger than the opposite direction, but such result is not strong enough to affirm the superiority of growth-expenditure relationship over expenditure-growth relationship between 1970 and 2016.

However, the implication of his result is that, the government should ensure that resources are well managed and allocated efficiently among competing needs to accelerate economic growth.

REFERENCES:

Abu, N. & Usman, A., "*Government Expenditure and Economic Growth in Nigeria*, 1970-2008: A Disaggregated Analysis. Business and Economics Journal, Vol. 4, (2010):1-11

Abu-Eideh, O. M., Causality between Public Expenditure and GDP Growth in Palestine: An Econometric Analysis of Wagner's Law. Journal of Economics and Sustainable Development. Vol. 6, No. 2, (2015): 189-199

Akpokerere, O. E. & Ighoroje, E. J., "*The Effect of Government Expenditure on Economic Growth in Nigeria: A Disaggregated Analysis from 1977 to 2009". International Journal of Economic Development Research and Investment*, Vol. 4, No. 1, (2013): 76-82

Alexiou, C., "*Government Spending and Economic Growth: Econometric Evidence from the South Eastern Europe (SEE)". Journal of Economic and Social Research*, Vol.11, No. 1. (2009): 1-16

Arpaia, A. & Turrini, A. (2008), "*Government Expenditure and Economic Growth in the EU: Long-run Tendencies and Short-term Adjustment". European Commission*, Vol. 300, 799-844
Available at: http://ec.europa.eu/economy_finance/publications.

Bose, N., Haque, M. E. & Osborn, D. R., "*Public Expenditure and Economic Growth: A Disaggregated Analysis for Developing Countries". The Manchester School Vol. 75*, No. 5, (2007): 533-556

Cooray, A, (2009), "*Government Expenditure*, Governance and Economic Growth". Comparative Economic Studies, 51(3): 401-418. Available at: http://www.ingentaconnect.com/content/pal/ces;jsessionid=q1g8lgkzfvms.alice.

Egbetunde, T. & Ismail O. Fasa, I. O., "*Public Expenditure and Economic Growth in Nigeria: Evidence from Auto-Regressive Distributed Lag Specification". Zagreb International Review of Economics & Business*, Vol. 16, No. 1, (2013): 79-92

Emelogu, C. O. & Uche, M. O., "*An Examination of the Relationship between Government Revenue and Government Expenditure in Nigeria: Co-integration and Causality Approach". Central Bank of Nigeria Economic and Financial Review Vol. 48*, No. 2, (2010): 35-57

Fasano, U. and Wang, Q. (2002), "*Testing the Relationship between Government Spending and Revenue: Evidence from GCC Countries". IMF Working Paper WP/02/201.*

Hsieh, E. & Lai, K.S., "*Government Spending and Economic Growth: The G-7 Experience". Applied Economics*, 26, (1994): 533-542

Idris, M. & Bakar, R., "*Public Sector Spending and Economic Growth in Nigeria: In Search of a Stable Relationship". Research Journal of Arts & Social Sciences*, 3(2), (2017): 1-19

Jelilov, G. & Musa, M. "*The Impact of Government Expenditure on Economic Growth in Nigeria". Sacha Journal of Policy and Strategic Studies*, Vol. 5, No. 1, (2016): 15-23

Landau, D., "*Government Expenditure and Economic Growth: A Cross-Country Study". Southern Economic Journal*, Vol. 49, No. 3, (1983): 783-792

Loizides J, Vamvoukas G., Government Expenditure and Economic Growth: Evidence from Trivariate Causality Testing". Journal of Applied Economics, 8(1), (2005): 125-152

Loto, M. A., "*Impact of Government Sectoral Expenditure on Economic Growth". Journal of Economics and International Finance*, Vol. 3(11), (2011): 646-652. Available online at http://www.academicjournals.org/JEIF.

Mitchell J. D., "*The Impact of Government Spending on Economic Growth". Backgrounder*, Heritage Foundation, 1831. (2005): 1-18. Available at: www.heritage.org/research/budget/bg1831.cfm.

Mo, P. K., "*Government Expenditures and Economic Growth: The Supply and Demand Sides". Hong Kong Baptist University Department of Economics,* School of Business, Kowloon Tong, Hong Kong, (2007).

Mohammadi, T., Maleki, B. & Gasti, H. P. (2012), "*The effect of government expenditure composition on economic growth: Evidence on ECO countries". Economics and Finance Review*, Vol. 2(5), (2012): 14-21. Available online at: http://www.businessjournalz.org/efr.

Nasiru, I., Government Expenditure and Economic Growth in Nigeria: Cointegration Analysis and Causality Testing. Academic Research International. Vol. 2, No. 3, (2012): 718-723

Nworji, I. D., Okwu, A.T. & Obiwuru, T. C., "*Effects of Public Expenditure on Economic Growth in Nigeria: A Disaggregated Time Series Analysis". International Journal of Management Sciences and Business Research*, Vol. 1, Issue 7. (2012): 1-14

Obeh, H.O., Ohwofasa, O. B. & Atumah, M., "*Impact of Government Expenditure in Education on Economic Growth in Nigeria*, 1986-2011: A Parsimonious Error Correction Model". African Journal of Scientific Research, Vol. 10, No. 1, (2012): 586-598

Okoro A. S. (2013), "*Government Spending and Economic Growth in Nigeria (1980-2011)". Global Journal of Management and Business Research Economics and Commerce) Volume XIII Issue V Version I (20-30).*

Omo, A., "*Cointegration*, Causality and Wagner's Law: A Test for Nigeria, 1970-2003" Central Bank of Nigeria Economic and Financial Review Volume 44, No. 2, (2006): 1-17

Omoke, P. C., "*Government Expenditure and National income: A Causality Test for Nigeria". European Journal of Economics and Political Science. Vol. 2*, (2009): 1-11

Taiwo. A. S. & Agbatogun, K.K., "*Government Expenditure in Nigeria: A Sine Qua Nonfor Economic Growth and Development". Jorind 9(2) December*, (2011): 155-162. Available online at: www.transcampus.org, www.ajol.info/journals/jorind.